

Claims

1. A light guide panel using a laser stamper, which is used as a rear surface light source of a liquid crystal display, wherein a substrate for the light guide panel, made of an acryl-based material allowing light to penetrate therethrough, is cut into a plurality of light guide panels, and an uneven pattern on a lateral surface of the light guide panel is formed by transcribing a reverse uneven pattern of the laser stamper onto the lateral surface of the light guide panel through a laser direct recording process.
2. The light guide panel as set forth in claim 1, wherein the substrate for the light guide panel is formed into a shape of a compact disc, used as a photodisc recording medium, having an inner perimeter of 15 mm, an outer perimeter of 120 to 300 mm, and a thickness of 0.4 to 1.5 mm, and a dimensional error of an inner perimeter, an outer perimeter, and a thickness of the substrate and the laser stamper is within a range of $\pm 10\%$.
3. The light guide panel as set forth in claim 1, wherein the acryl-based material is selected from the group consisting of polymethacrylate (PMMA), polycarbonate (PC), and cycloolefin copolymer (COC).
4. A method of producing a light guide panel using a laser stamper, comprising:
- cleaning and drying a substrate;
- coating a photosensitizer on the cleaned and dried substrate, and heating and cooling the photosensitizer-coated substrate;
- irradiating a laser beam onto the photosensitizer-coated substrate to record a pattern on the photosensitizer-coated substrate;
- developing the patterned substrate;
- coating a seed layer on the developed substrate;
- constructing a metal master with a predetermined thickness on the seed

layer-coated substrate;

processing a rear surface of the metal master;

cutting and polishing the metal master as a way to be fitted in a mold to produce the laser stamper;

5 injection-molding the laser stamper after the laser stamper is installed in the mold to accomplish the substrate for the light guide panel; and

cutting the substrate for the light guide panel.

10 5. The method as set forth in claim 4, wherein a plurality of engraved stampers are produced or reproduced using one embossed stamper through an electroforming process in which a master model corresponding in shape to a reflection shape is made out of a predetermined material, after a master pattern is removed, in a case of the laser stamper is the embossed stamper.

6. A device for producing a light guide panel, comprising:

15 a laser stamper producing part to produce a laser stamper capable of conducting a laser direct recording process, and

a light guide panel producing part to produce a substrate for the light guide panel and the light guide panel in commercial quantity using the laser stamper,

20 wherein, the laser stamper includes a metal stamper to prevent durability of an acryl-based substrate from being reduced when the acryl-based substrate is used in an injection molding process.

7. The device as set forth in claim 6, wherein the laser stamper producing part comprises:

25 a substrate cleaning and drying unit to remove impurities or alien substances from a substrate;

a photosensitizer coating/heating/cooling unit to coat a photosensitizer for a laser direct recording process on the substrate using a turntable to minimize a thickness deviation of the photosensitizer coated on the substrate, and increases

an attachment power between the substrate and photosensitizer through a heating and a cooling process;

5 a laser beam recording unit to form a desired pattern on the photosensitizer-coated substrate using a laser beam through the laser direct recording process;

a developing unit to remove a portion of the substrate, which is irradiated by the laser beam, using a developing solution;

a seed layer coating unit to coat a seed layer on the developed substrate;

10 a metal master producing unit to deposit a metal layer on the substrate coated with the seed layer to produce a metal master;

a rear surface processing unit to grind a rear surface of the metal master; and

a stamper cutting unit to cut the metal stamper such that the cut metal stamper is fitted in the mold to produce the laser stamper.

15 8. The device as set forth in claim 6, wherein the light guide panel producing part comprises:

an injection molding unit to produce the substrate for the light guide panel through the injection molding process after the laser stamper is mounted on the mold; and

20 a light guide panel cutting unit to cut the substrate for the light guide panel, produced through the injection molding process, into each light guide panel.

25 9. The device as set forth in claim 7, wherein the seed layer is a thin film allowing a current to flow therethrough, and is used as a conductive layer in an electroforming process.

10. The device as set forth in claim 7, wherein the rear surface processing unit grinds the rear surface of the metal master such that the rear surface of the metal master has a roughness suitable to mount the metal master on

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an injection molder used as the injection molding unit.